

# Two new species of *Apatophyllum* McGillivray (Celastraceae) from Queensland

A.R. Bean and L.W. Jessup

## Summary

Bean A.R. & Jessup L.W. (2000). Two new species of *Apatophyllum* McGillivray (Celastraceae) from Queensland. *Austrobaileya* 5(4): 691–697. *Apatophyllum teretifolium* and *A. flavovirens*, both endemic to Queensland, are newly described and illustrated. The distribution, habitat and conservation status of each is discussed. Generic distinctions between *Apatophyllum* and *Maytenus* are discussed, including a comparison of the stomatal types possessed by the two genera. A key to all known species of *Apatophyllum* is presented.

Keywords: *Apatophyllum*, *Maytenus*, *Gymnosporia*, *Apatophyllum teretifolium*, *Apatophyllum flavovirens*, Celastraceae, key, taxonomy, stomata, new species, Australian flora, Queensland.

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## Introduction

The genus *Apatophyllum* was described by McGillivray (1971), comprising two species, both rare, from eastern Australia. Since then, a further species has been named from Western Australia (Cranfield & Lander, 1992).

*Apatophyllum* is closely related to both *Psammomoya* Diels & Loes. and *Maytenus* Molina.

*Apatophyllum* has been adequately compared and contrasted with *Psammomoya* (McGillivray loc. cit.; Cranfield & Lander, loc. cit.). However, no previous comparisons have been made between *Apatophyllum* and *Maytenus* Molina, except McGillivray's report of an examination of wood structure by C.R. Metcalfe (loc. cit.) where he states that "a comparison [of *Apatophyllum*] with two sclerophyllous Australian species of *Maytenus* did not reveal any ... significant similarities".

*Apatophyllum* has been distinguished from *Maytenus* (Jessup 1984) by its solitary inflorescence. The discovery of a species with cymose 1–3 flowered inflorescence has therefore somewhat blurred the generic boundary between these genera. *Maytenus*

undoubtedly contains a rather heterogeneous assemblage of species, and this is evidenced by the recent reinstatement of *Gymnosporia* (Wight & Arn.) Hook.f. by Jordaan & van Wyk (1999). A review of the whole of *Maytenus* and its allies is needed to establish the phylogenetic relationships of the group, but we feel that the maintenance of *Apatophyllum* as a genus is justified, because of differences in inflorescence structure, leaf venation and stomatal type.

C.R. Metcalfe (in McGillivray loc. cit.) reported paracytic stomata for *Apatophyllum* and *Psammomoya*, which was the first recorded occurrence of that type of stoma for the family. Subsequently Den Hartog & Baas (1978) reported paracytic stomata from several Celastraceae genera, but from only two Australian species (*Hedraianthera porphyropetala* F.Muell. and *Euonymus globularis* Ding Hou). We have examined the stomata of several species of *Apatophyllum* and *Maytenus* s.l.. The results are reported below.

*Apatophyllum* differs from Australian *Maytenus* by its inflorescences formed strictly in the axils of true leaves, usually solitary; the well developed peduncles and the greatly

reduced primary inflorescence axis; paracytic stomata; and the parallel leaf venation and pungent leaf apices. *Maytenus*, by contrast, often has inflorescences borne in the axils of small bracts or prophylls; the primary axis is well-developed, giving rise to a pseudo-racemose inflorescence (or, in the case of *M. fasciculiflora* Jessup, both peduncle and primary axis are greatly reduced), usually several-flowered; stomata laterocytic or cyclocytic; and the leaf venation reticulate, even in the narrowest leaves, and leaf apices never pungent.

To accommodate the two new species described below, the generic description for *Apatophyllum* given in Jessup (1984) needs to be amended as follows: leaves opposite, subopposite or alternate, inflorescences 1–3 flowered, cymose, axillary, bisexual; sepals 4 or 5, petals 4 or 5, stamens 4 or 5; ovary + immersed in disc, 2 or 3-locular.

Jordaan and van Wyk (1999) reinstated the genus *Gymnosporia* (Wight & Arn.) Hook.f. We accept this change and agree that the names *Maytenus emarginata* (Willd.) DingHou, *Gymnosporia emarginata* (Willd.) Theu. and *G. senegalensis* (Lam.) Loes. should not be applied to Malesian and Australian specimens *sensu* Hou (1962) and Jessup (1984). We consider that these specimens (including Brass 6229 which was cited by Den Hartog & Baas (1978)), should rightly be called *Gymnosporia inermis* Merr. & Perry.

**Stomata**

Microscope slides of cleared cuticle were prepared for 4 species of *Apatophyllum* (*A. teretifolium*, *A. flavovirens*, *A. constablei* McGillivray, *A. olsenii* McGillivray) and 3 species of *Maytenus* (*M. silvestris* Lander & L.A.S.Johnson, *M. cunninghamii* (Hook.) Loes., *M. disperma* (F.Muell.) Loes. and for *G. inermis*.

Stomatal types were classified using the terminology given in Dilcher (1974), Den Hartog & Baas (1978) and Inamdar et al. (1986). All of the *Apatophyllum* species examined were found to possess paracytic stomata, characterised by the consistent presence of two subsidiary cells adjacent to the guard cells and with the same orientation (Fig. 3A-C). *Maytenus silvestris* and *Gymnosporia inermis* were found to possess laterocytic stomata, according to the terminology of Den Hartog & Baas (1978), where three or more subsidiary cells border onto the lateral sides of the guard cell pair. In *Maytenus disperma* and *M. cunninghamii* the stomata are apparently cyclocytic, where the subsidiary cells are not all arranged laterally to the guard cells. In both the laterocytic and cyclocytic types examined, the subsidiary cells are partially submerged, so that they are not plainly visible when the rest of the epidermis is in sharp focus.

Species	Stomatal type	Voucher
<i>Maytenus silvestris</i>	laterocytic	Halford Q1551 (BRI)
<i>Maytenus cunninghamii</i>	cyclocytic	Grimshaw PG473 (BRI)
<i>Maytenus disperma</i>	cyclocytic	Forster 3235 et al. (BRI)
<i>Gymnosporia inermis</i>	laterocytic	Brass 6229 (BRI)
<i>Apatophyllum olsenii</i>	paracytic	Forster 16341 & Thompson (BRI)
<i>Apatophyllum teretifolium</i>	paracytic	Bean 1401 (BRI)
<i>Apatophyllum flavovirens</i>	paracytic	Bean 2225 (BRI)
<i>Apatophyllum constablei</i>	paracytic	Constable & McGillivray 3061 (BRI)

# Taxonomy

## *Apatophyllum teretifolium* A.R.Bean & Jessup

**sp. nov.** affinis *A. constablei* autem stipulis brevioribus, fructibus longioribus, floribus pro parte maxima 4-meris, petalis brevioribus differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Lonesome National Park, NNE of Injune, 6 May 1999, *A.R.Bean* 14832 (holo: BRI; iso: AD, K, MEL, MO, NSW, PERTH, distribuendi)

*Apatophyllum* sp. (Expedition Range E.J. Thompson AQ440723) in Henderson (1997).

Densely branched rounded shrub 25–40 cm high, glabrous. Leaves sessile, opposite to sub-opposite or occasionally alternate, linear, (6–) 8–12 × 0.3–0.5 mm, elliptical in cross-section; venation obscure, longitudinal; apex acute to acuminate, pungent-pointed. Stipules linear, 0.9–1.5 mm long, brown, persistent, mostly broad-based and with 2 or 3 short lateral lobes; apex acute to acuminate. Inflorescence axillary, reduced to a single flower, with 1 or sometimes 2 pairs of empty pherophylls shortly distal to the base of the axis. Anthopodia 1.7–2.5 mm long. Pherophylls cymbiform, 0.9–1.5 mm long, apex acute, margins denticulate. Perianth 4 or 5-merous. Sepals deltate, 0.6–0.7 mm long, persistent on mature capsule; apex acuminate, margins denticulate. Petals deltate, 0.9–1.2 mm long, 0.7–0.9 mm wide at base, white, somewhat persistent beyond anthesis; apex acute, margins entire. Stamens 4 or 5, equal in number to petals, inserted on margin of disc; filaments tapering, 0.4–0.5 mm long, somewhat persistent beyond anthesis; anthers basifixed, 0.3–0.4 mm long and c. 0.4 mm across. Disc fleshy, shallowly cupular. Ovary ovoid, 2-locular, almost completely immersed in disc; ovules 2 per loculus. Style 0.6–0.7 mm long. Capsule compressed obovoid, 2-valved, 5.2–6 × 2.0–2.8 mm, surface smooth or minutely papillose. Seeds ellipsoidal, c. 3.2 mm long, c. 1.4 mm in diameter; testa dark brown, smooth but with fine transverse markings; aril white, clasping base of seed. Fig. 1, 3C.

**Specimens examined: Queensland.** LEICHHARDT DISTRICT: Lonesome N.P., north-east of Injune, Mar 1990, *Bean* 1401 (BRI); Expedition Range, c. 30 km WSW of Bauhinia Downs, Mar 1984, *Thompson* s.n. (BRI). BURNETT DISTRICT: near Panda Lane, Waaje, NW corner of Barakula S.F., via Chinchilla, Mar 1998, *Bean* 13138 (BRI, CANB, NSW, MEL).

**Distribution and habitat:** *A. teretifolium* is known from 3 localities; the Expedition Range, Lonesome National Park, and the Barakula State Forest near Chinchilla (Map 1). It grows in *Eucalyptus* dominated woodland to low open woodland with a heathy understorey, on shallow sandy soils.

**Phenology:** Flowers and fruits are recorded for March and May.

**Notes:** A large proportion of seeds are evidently destroyed by caterpillars. Insect predation is likely to be a limiting factor for regeneration of this species.

*A. teretifolium* differs from *A. constablei* by the shorter stipules, longer fruits, the predominantly 4-merous flowers and the shorter petals.

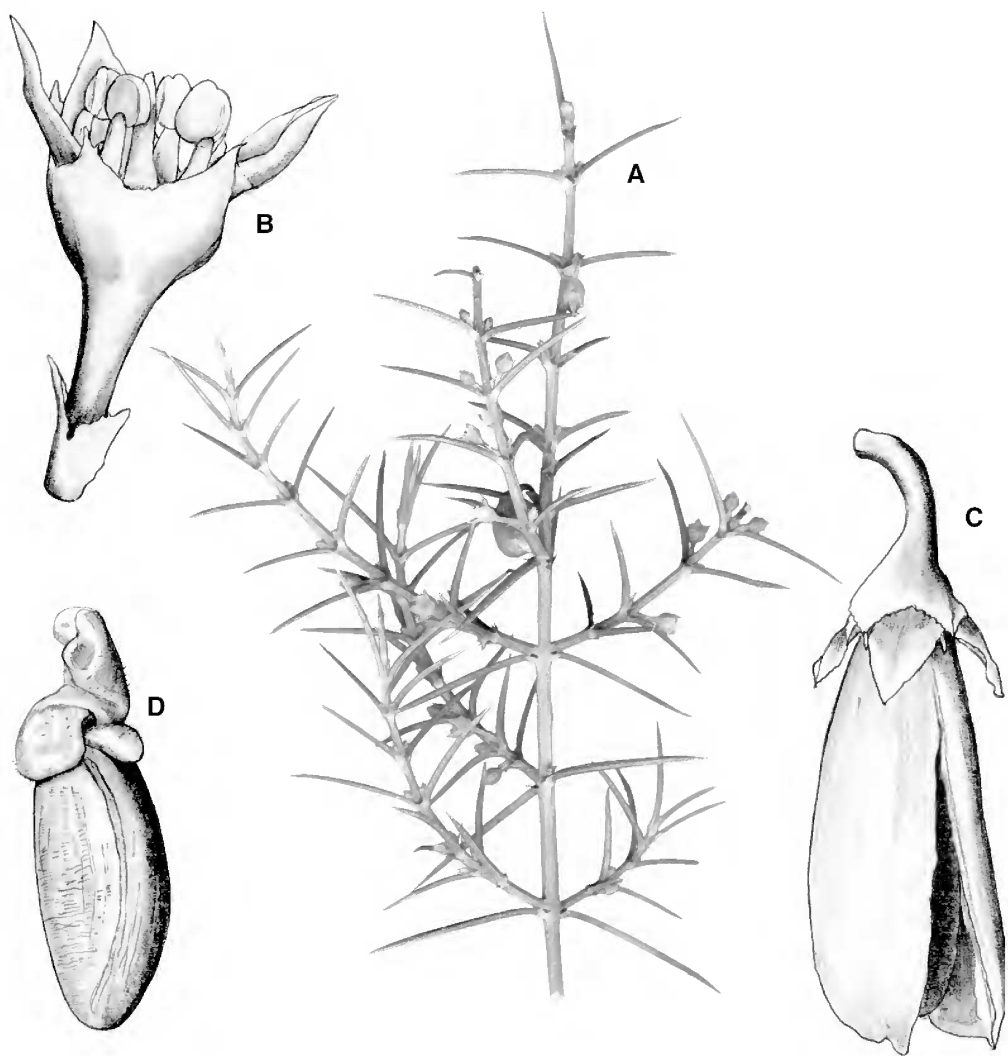
**Conservation status:** Three populations of *A. teretifolium* have been recorded. Applying the IUCN guidelines (Anon. 1994), a category of ‘vulnerable’ is proposed (Criterion D2).

**Etymology:** From the Latin *teretifolius*, meaning ‘with terete leaves’.

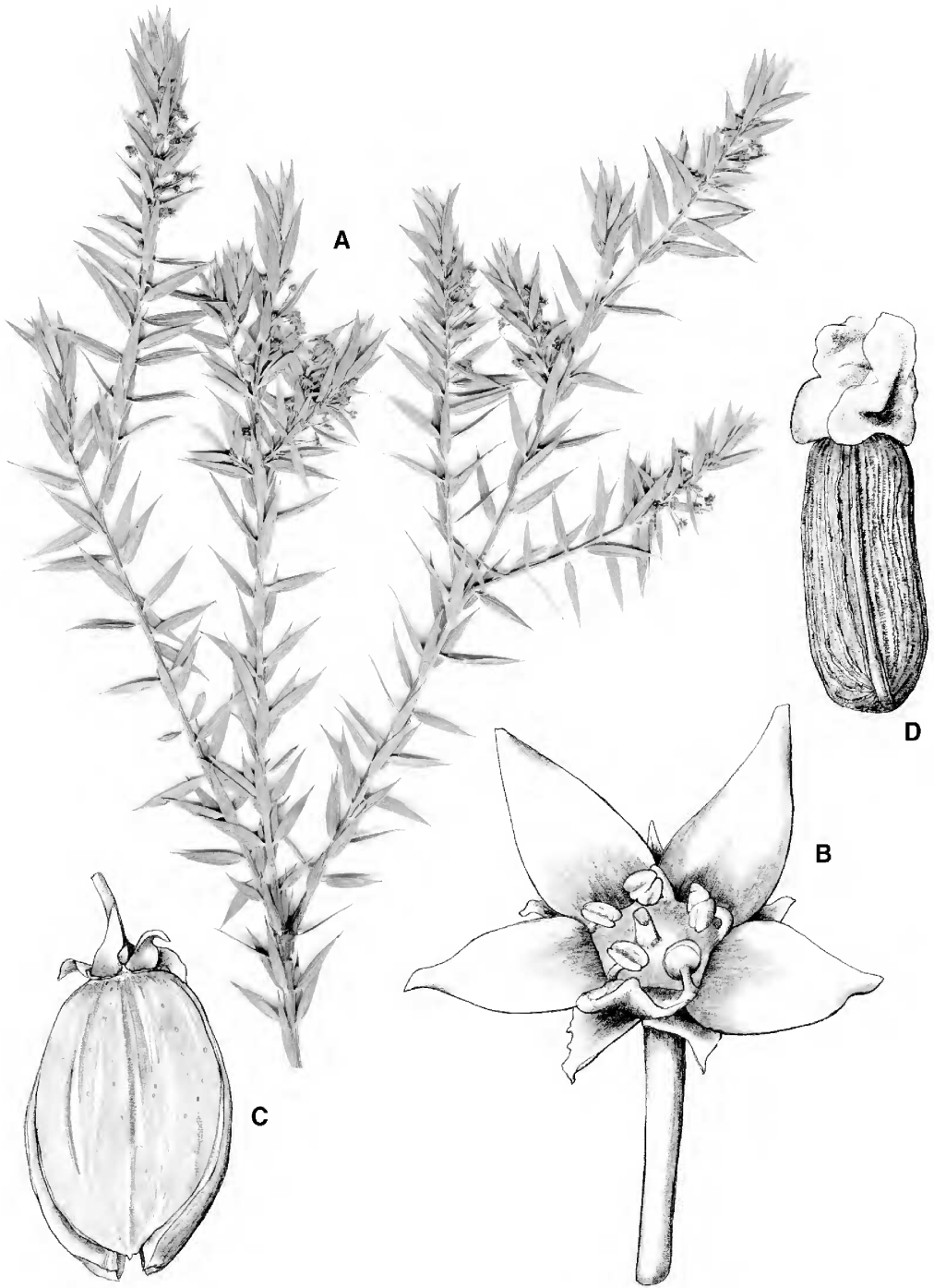
## *Apatophyllum flavovirens* A.R.Bean & Jessup

**sp. nov.** affinis *A. olsenii* autem foliis latioribus, stipulis longioribus, inflorescentiis cymosis, pedunculis anthopodiis longioribus, ovario 3-loculari, petalis longioribus differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Bull Creek Gorge, 15 km W of ‘Castlevale’, W of Springsure, 4 September 1990, *A.R.Bean* 2225 (holo: BRI; iso: AD, DNA, MEL, NSW, PERTH).

*Apatophyllum* sp. (Bull Creek A.R.Bean 2225) in Henderson (1997).



**Fig. 1.** *Apatophyllum teretifolium*. A. fertile branchlet  $\times 2$ . B. flower (with one petal removed) and prophylls  $\times 20$ . C. fruit  $\times 10$ . D. seed  $\times 10$ . A-C, *Bean 14832*; D, *Bean 1401*.



**Fig. 2.** *Apatophyllum flavovirens*. A. fertile branchlet  $\times 0.8$ . B. oblique view of flower  $\times 8$ . C. fruit  $\times 5$ . D. seed  $\times 10$ . all from *Bean 2225*.



Branched rounded shrub 100 cm high, glabrous. Petioles 0.5–1 mm long. Leaves alternate, narrowly lanceolate, 9–21 × 1.6–3.0 mm, flat; venation parallel, longitudinal; apex acute to acuminate, pungent-pointed. Stipules linear, 0.3–0.7 mm long, white or yellowish, persistent, entire to obscurely lobed; apex acute. Inflorescence axillary, dichasially cymose with up to 3 flowers or reduced to a single flower, with 1–several pairs of pherophylls. Anthopodia 2.0–4.0 mm long at anthesis. Pherophylls cymbiform, 0.8–1.3 mm long, apex acute, margins entire. Peduncles 2–3.5 mm long. Perianth 5-merous. Sepals deltate, 0.6–0.9 mm long, persistent; apex acute, margins entire. Petals deltate, 1.7–2.0 mm long, 1.1–1.2 mm wide at base, yellow, persistent; apex acute, margins entire. Stamens 5, inserted on margin of disc; filaments tapering, c. 0.4 mm long; anthers dorsifixed, c. 0.3 mm long and c. 0.3 mm across. Disc fleshy, flat. Ovary ovoid, 3-locular, partially immersed in disc; ovules 2 per loculus. Style 0.5–0.6 mm long. Capsule obovoid, 3-valved, 8–9.5 × 6–7 mm, surface smooth. Seeds cylindrical, c. 4.0 mm long, c. 1.7 mm in diameter; testa brown, longitudinally striate; aril white, clasping base of seed. Fig. 2, 3B.

**Additional specimen examined:** Queensland. LEICHHARDT DISTRICT: Bull Creek Gorge, S of Springsure-Tambo road, Sep 1999, *Bean* 15370 (BRI, K, MO, NSW).

**Distribution and habitat:** *A. flavovirens* is known only from the type locality (Map 1), where it grows on a skeletal sandstone slope (west facing) in open woodland with *Eucalyptus decorticans*, *Corymbia hendersonii* and *Acacia shirleyi*. Associated understorey species include *Micromyrtus leptocalyx*, *Triodia mitchellii*, *Grevillea longistyla* and *Acacia* spp.

**Phenology:** Flowers and fruits are recorded for September.

**Affinities:** *A. flavovirens* differs from *A. olsenii* by the leaves 1.6–3 mm wide (0.7–1.5 mm for *A. olsenii*), stipules longer, 0.3–0.7 mm long (vs. 0.2–0.3 mm long for *A. olsenii*), cymose inflorescence, longer peduncles and pedicels, 3-locular ovary (2-locular for *A. olsenii*) and the longer and wider petals.

**Conservation status:** *A. flavovirens* is known from only 19 individuals at the type locality. No further plants were discovered during a three day field trip to the area in September 1999. Applying the IUCN guidelines (Anon. 1994), a category of ‘critically endangered’ is proposed (Criterion D).

**Etymology:** From the Latin *flavovirens*, meaning yellowish green, in reference to the leaf colour.

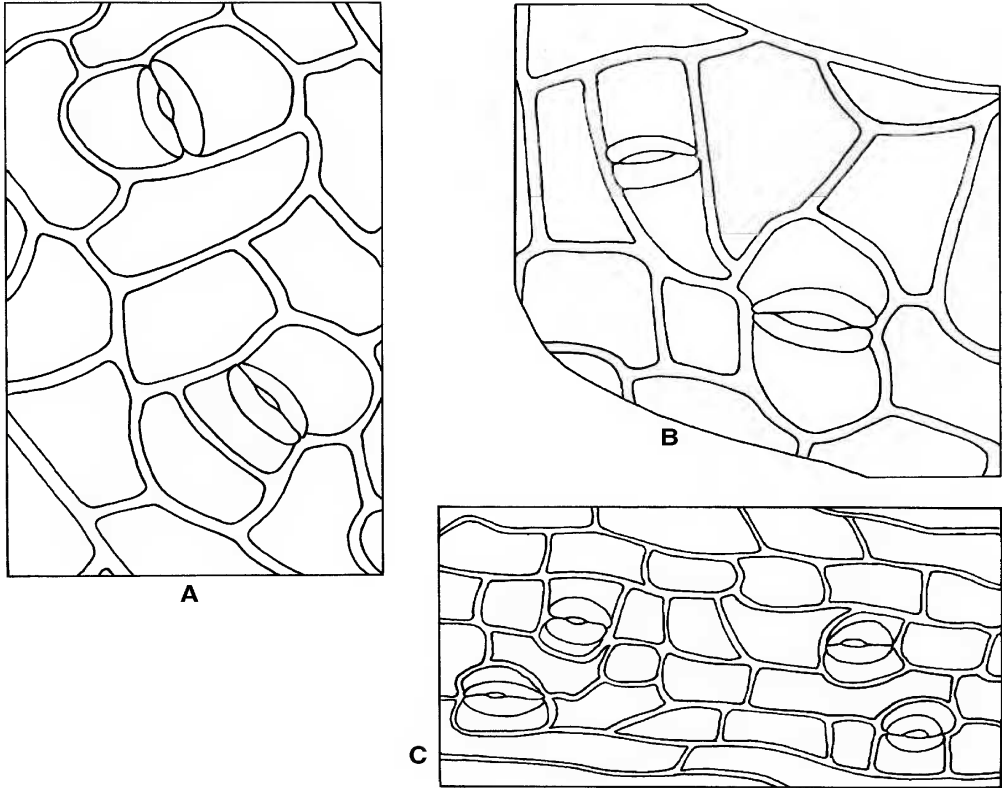
### Key to the species of *Apatophyllum*

1. Leaves linear, to 0.6 mm wide, terete or almost so ..... 2  
    Leaves linear-lanceolate to lanceolate, 0.7–3 mm wide, flat ..... 4
2. Perianth 5-merous; petals 1.2–3.5 mm long ..... 3  
    Perianth predominantly 4-merous; petals 0.9–1.2 mm long ..... **A. teretifolium**
3. Petals 1.2–1.5 mm long, margins entire ..... **A. constablei**  
    Petals 2–3.5 mm long, margins fimbriate ..... **A. macgillivrayi**
4. Leaves 1.6–3 mm wide; inflorescence cymose; ovary 3-locular ..... **A. flavovirens**  
    Leaves 0.7–1.5 mm wide; inflorescence solitary; ovary 2-locular ..... **A. olsenii**

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photographing them, to Phil Sharpe for a German translation, to Keith McDonald for assistance in the field, and to Les Pedley for the Latin diagnoses.



**Fig. 3.** Stomatal patterns in *Apatophyllum*. A. *Apatophyllum olsenii*  $\times 500$ . B. *Apatophyllum flavovirens*  $\times 500$ . C. *Apatophyllum teretifolium*  $\times 300$ . A, Forster 16341 & Thompson; B, Bean 2225; C, Bean 1401 (all BRI).

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